

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 June 2004 (24.06.2004)

PCT

(10) International Publication Number
WO 2004/054015 A3

(51) International Patent Classification⁷: **H01M 4/80**,
4/66, 4/04, 4/32, 4/48, C25D 3/16, 3/02

3 Hanley Road, Southampton, Hampshire SO15 5AP
(GB). NELSON, Phillip, A. [GB/GB]; 48 Queen Street,
Henley-on-Thames RG9 1AP (GB).

(21) International Application Number:
PCT/GB2003/005441

(74) Agent: TUBBY, David, George; Marks & Clerk, 57-60
Lincoln's Inn Fields, London WC2A 3LS (GB).

(22) International Filing Date:
12 December 2003 (12.12.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0229080.7 12 December 2002 (12.12.2002) GB

(71) Applicant (for all designated States except US): UNI-
VERSITY OF SOUTHAMPTON [GB/GB]; Highfield,
Southampton SO17 1BJ (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR,
CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,
GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,
MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU,
SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

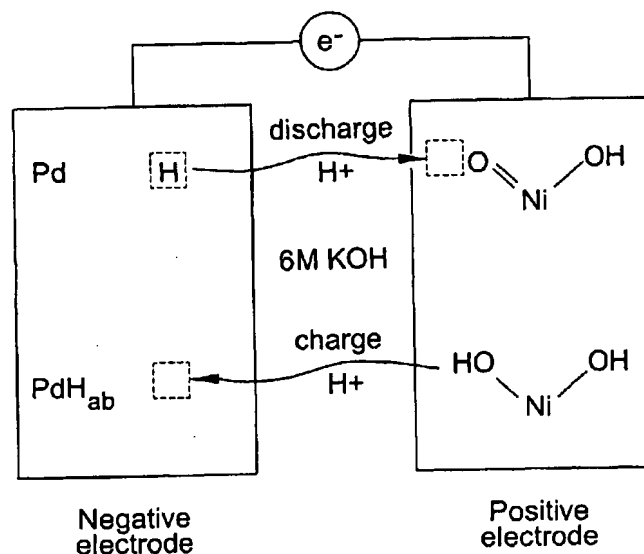
(84) Designated States (regional): ARIPO patent (BW, GH,
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE,
SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

(75) Inventors/Applicants (for US only): BARTLETT,
Philip, Nigel [GB/GB]; Amara, 11 Roseberry Road, Al-
resford S024 9HQ (GB). OWEN, John, Robert [GB/GB];

[Continued on next page]

(54) Title: ELECTROCHEMICAL CELL



(57) Abstract: An electrochemical cell comprising a cathode, an anode and an electrolyte is provide, wherein: the cathode comprises mesoporous nickel having a periodic arrangement of substantially uniformly sized pores of cross-section of the order of 10^{-8} to 10^{-9} m; and the anode comprises a mesoporous material having a periodic arrangement of substantially uniformly sized pores of cross-section of the order of 10^{-8} to 10^{-9} m and selected from: carbon, cadmium, iron, a palladium/nickel alloy, an iron/titanium alloy, palladium or a mixed metal hydride.



Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
3 February 2005

(15) Information about Correction:

Previous Correction:

see PCT Gazette No. 44/2004 of 28 October 2004, Section II

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

national Application No

Γ/GB 03/05441

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H01M4/80 H01M4/66 H01M4/04 H01M4/32 H01M4/48 C25D3/16 C25D3/02					
According to International Patent Classification (IPC) or to both national classification and IPC					
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 H01M C25D					
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched					
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, INSPEC, COMPENDEX, WPI Data					
C. DOCUMENTS CONSIDERED TO BE RELEVANT					
Category *	Citation of document, with indication, where appropriate, of the relevant passages				Relevant to claim No.
A	EP 1 115 130 A (KANEBO LTD) 11 July 2001 (2001-07-11) paragraphs '0042!', '0043!; claims 1,13,14; figure 8; examples 1,5,6 -----				1-11
A	NELSON P A ET AL: "MESOPOROUS NICKEL/NICKEL OXIDE ELECTRODES FOR HIGH POWER APPLICATIONS" JOURNAL OF NEW MATERIALS FOR ELECTROCHEMICAL SYSTEMS, ECOLE POLYTECHNIQUE DE MONTREAL, MONTREAL, CA, vol. 5, no. 1, January 2002 (2002-01), pages 63-65, XP001046009 ISSN: 1480-2422 cited in the application the whole document ----- -/--				1-11
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.					
* Special categories of cited documents : *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art. *G* document member of the same patent family					
Date of the actual completion of the international search 19 November 2004			Date of mailing of the international search report 06/12/2004		
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016			Authorized officer Lilimpakis, E		

INTERNATIONAL SEARCH REPORT

International Application No.

.../GB 03/05441

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NELSON P A ET AL: "MESOPOROUS NICKEL/NICKEL OXIDE-A NANOARCHITECTURED ELECTRODE" CHEMISTRY OF MATERIALS, AMERICAN CHEMICAL SOCIETY, WASHINGTON, US, vol. 14, no. 2, February 2002 (2002-02), pages 524-529, XP001163942 ISSN: 0897-4756 cited in the application the whole document	1-11
A	US 6 203 925 B1 (GOELTNER CHRISTINE ET AL) 20 March 2001 (2001-03-20) cited in the application column 4, line 32 - line 47 column 6, line 1 - line 6	1-11
A	WO 01/89991 A (VIABLE KOREA CO LTD ; OH SEUNG MO (KR); YOON SONG HUN (KR); FINECELL C) 29 November 2001 (2001-11-29) the whole document	1-11
A	WO 99/00536 A (ATTARD GEORGE SIMON ; BARTLETT PHILIP NIGEL (GB); ELLIOTT JOANNE (GB);) 7 January 1999 (1999-01-07) cited in the application claims 1-4; examples 1-12	1-11
A	EP 1 244 168 A (FRANCOIS SUGNAUX) 25 September 2002 (2002-09-25) abstract	1-18
A	G.S. ATTARD ET AL: "Mesoporous Pt/Ru Alloy from the Hexagonal Lyotropic Liquid Crystalline Phase of a Nonionic Surfactant" CHEM.MATERIAL, 27 April 2001 (2001-04-27), pages 1444-1446, XP002306570 the whole document	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 03/05441

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1115130	A	11-07-2001	EP 1115130 A1	11-07-2001
			US 6631073 B1	07-10-2003
			CN 1315046 T	26-09-2001
			WO 0011688 A1	02-03-2000
US 6203925	B1	20-03-2001	AU 743153 B2	17-01-2002
			AU 6303498 A	18-09-1998
			CA 2282528 A1	03-09-1998
			EP 0963266 A1	15-12-1999
			WO 9837997 A2	03-09-1998
			JP 2001513147 T	28-08-2001
WO 0189991	A	29-11-2001	KR 2002031447 A	02-05-2002
			CN 1452592 T	29-10-2003
			EP 1292534 A1	19-03-2003
			JP 2004503456 T	05-02-2004
			WO 0189991 A1	29-11-2001
			US 2004047798 A1	11-03-2004
WO 9900536	A	07-01-1999	AT 222301 T	15-08-2002
			AU 733930 B2	31-05-2001
			AU 8225098 A	19-01-1999
			CA 2295223 A1	07-01-1999
			DE 69807230 D1	19-09-2002
			DE 69807230 T2	17-04-2003
			EP 0993512 A1	19-04-2000
			WO 9900536 A2	07-01-1999
			HK 1026236 A1	03-01-2003
			JP 2002506485 T	26-02-2002
			US 6503382 B1	07-01-2003
EP 1244168	A	25-09-2002	EP 1244168 A1	25-09-2002
			CA 2441125 A1	26-09-2002
			WO 02075826 A2	26-09-2002
			EP 1374325 A2	02-01-2004
			US 2004131934 A1	08-07-2004